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ABSTRACTS OF THE 19TH CONGRESS OF ECHOCARDIOGRAPHY

Poster session: Congenital heart disease

Interest of three-dimensional echocardiography for the diagnosis of bicuspid aortic valve in children

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Background.— Bicuspid aortic valve (BAV) is the most common congenital heart defect. Children with BAV are more likely to have valve dysfunction and to require intervention during childhood. According to the subtype of BAV, prognosis and treatment may be different.
Objective.— To assess the accuracy of 3D echocardiography (3DE) in order to diagnose BAV and to depict accurately the leaflets morphology.
Materials and methods.— Seventy-two consecutive children with suspicion of BAV were included in a prospective monocentric study. 2DE and 3DE views were recorded by the same investigator and analysed separately by two confirmed paediatric cardiologists in order to assess BAV. We compared 2DE and 3DE for the description of the spatial position of cusps and raphes. The association with aortic aneurysms, aortic coarctation, aortic insufficiency or stenosis and other cardiac malformation were also reported.
Results.— The median age was 5 years. Using 3DE, BAV was not found in 11,1%[CI 95%, 5,0—20,7] of suspected patients on 2DE. Only 44,4% of uncertain BAV on 2DE was confirmed by 3DE. For 34,4%[CI 95%, 22,9—47,3] of patients, 3DE allowed a better visualisation of leaflets morphology leading to a reclassification of the BAV. The correlation between 2DE and 3DE was moderate ($\kappa = 0.57$) concerning the classification of BAV according to the raphe localisation. Mean time 3DE acquisition is 2,3 minutes; interobserver variability in 3DE is almost null ($\kappa = 0.93$).
Conclusion.— 3DE is simple, rapid and reliable to diagnose and describe precisely BAV in children. This may be particularly helpful to precise the prognosis or to guide the surgeon.

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Interest of speckle tracking for the assessment of right ventricular function in operated tetralogy of Fallot. Comparison with magnetic resonance imaging

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Background.— Right ventricular (RV) function is a major determinant of prognosis in patients (pts) with operated tetralogy of Fallot (ToF), but its evaluation remains challenging. We compared results from speckle tracking (2D strain) and conventional echocardiogram (echo) with those of magnetic resonance imaging (MRI).
Methods.— Transthoracic echo and MRI were performed in all pts. Systolic RV function was analysed in the apical 4-chamber view by % RV surface shortening, tricuspid annular plane systolic excursion (TAPSE) and 2D strain. Longitudinal maximal systolic strain was evaluated. Measurements were performed off-line by two independent observers. All echo results were compared to RV volumes and RV ejection fraction (EF) estimated by MRI.
Results.— Ten pts, (seven males), aged 11—31yrs (20.7 ± 6.6), operated on 20 ± 5 yrs before for a ToF were included. All pts had significant pulmonary valvular regurgitation. All RV systolic function parameters were decreased in all pts: $38 \pm 8\%$ for RV surface shortening, 17.9 ± 3 mm for TAPSE, $42 \pm 11\%$ for RVEF by MRI. Global RV systolic strain was $-19.3 \pm 2.1\%$, free wall strain was $-20.5 \pm 3.1\%$ and septal wall strain was $-18 \pm 2.7\%$ on average for the whole group. TAPSE and % RV surface shortening were not correlated with RV volumes or RVEF, whereas global 2D strain correlated quite well with RVEF: $r2 = 0.48$, $P < 0.05$. Feasibility, intra- and interobserver reproducibility of 2D strain were adequate.
Conclusions.— Speckle tracking (2D strain) is a new and promising method of estimating RV systolic function in pts operated on for ToF. Its prognostic value remains to be determined in larger series of pts.

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A new approach to the evaluation of stroke volume and cardiac output by Doppler. Transthoracic echocardiography in the paediatric cardiac ICU

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Introduction.— Stroke volume (SV-ETT) is hitherto evaluated by transthoracical Doppler (TTE) as: (circular) cross sectional area(CSAO) × velocity time integral (VTI). Cardiac output (CO) can thereof be derived as: SV-ETT × heart frequency (HF). Based on previous transesophageal Doppler studies showing that the aortic valve-opening surface is in fact triangular, we developed a modified triangular valve model of the aortic valve-opening surface (CSA△), for transthoracic SV calculation referring it to bioimpedance measurement of SV (SV-Bio) as another non-invasive method in our paediatric ICU.
Method.— In 24 newborns after arterial switch for transposition of the great arteries, CSAO was measured in the long axis view. CSA△ was measured in the short axis view by measuring two orthogonal aortic valve diameters at the leaflet level, then calculating their average. CSAO/CSA△ were then multiplied by VTI in the five-chamber view with the sample at the same level to obtain SV-ETT and then compared to SV-Bio measured at the same time.

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